

Financing Bio-Renewable Energy (BRE) in the LAO PDR

BRE is energy generated with low environmental impact and low Green House Gas emissions, using biomass (plant or animal) or other renewable resources (solar, hydro). The Lao PDR's abundant natural resources favour extensive small and large-scale BRE generation, and yet 37% of the population had no access to electricity in 2009, and the country relies heavily on imported fossil fuels, both as electricity and petroleum products. Fuel wood accounts for most of the total energy consumed, but conventional practices are often inefficient, damaging the environment and burdening people who collect and burn it. The potential to develop BRE technologies is therefore substantial, and can contribute towards national goals for energy security, and rural development.



Existing policies and institutional guidelines

The following strategies provide the framework for actors in the sector:

Electricity Law (2006, amended in 2009) includes a licensing agreement for private investors seeking to develop Independent Power Purchase (IPP) projects.

Renewable Energy Strategy (2000, to be amended in 2010) will give an action plan for all renewable energies, and contains decrees on Petrol Savings, Biofuel Promotion and Small Hydropower.

National Strategy and Action Plan on Climate Change (NSAPCC) includes information on carbon credit for small hydropower and biogas, energy efficiency in buildings and industry, low carbon transportation, and solid waste management. The strategy also includes strengthening the Lao PDR's suitability to financial instruments.

National Socio-Economic Development Plan (NSED) 2006-2010 promotes energy-efficient and non-polluting technologies. Generation of electricity for export is given priority, as a source of revenue and as a means to achieve 90% electrification of the population by 2020. **NSED 2010-2015** will further promote hydropower and renewable energy, to improve energy security and make the Lao PDR an energy hub for the Association of Southeast Asian Nations (ASEAN).

Existing financing mechanisms

Large and medium Independent Power Purchase (IPP) projects are often guaranteed by international banks, credit export companies, and foreign capital investment. Official Development Assistance (ODA) funds most other BRE projects, supplemented by private investment. A few BRE projects are financed through Clean Development Mechanism (CDM) projects and microfinance.

Solarpower

With on average 2,420 hours of sunlight per year and a favourable climate, the Lao PDR is well suited to solar photovoltaic and thermal energy technologies for electricity and heat generation. Solar PV is generally more expensive than grid electricity, but requires low maintenance and is appropriate for rural areas.

Solar PV is used in the Lao PDR for Solar Home Systems (>20W per system), village grids (few kW), charging stations, and specific applications such as water pumps. Some commercial and private buildings use solar water heating.

Hydropower

The Lao PDR has good hydro potential, with mountainous terrain and numerous waterways. Flowing water can be used to generate mechanical and electrical power, proportional to the head (the fall in elevation) and flow at the turbine (or wheel). Different technologies are needed for sites with high or low head. Seasonal variation is also important, because dams may be needed to ensure year-round supplies.

Larger hydro power (more than 1 MW) accounts for almost all electricity generated in the Lao PDR, and most of this is exported. The largest sites are coordinated by central government (MEM/DOE), and projects smaller than 5MW are licensed at provincial level (PDEM). Several smaller sites supply to one or more villages, and pico-hydro turbines (typically less than 5 kW) are widely used in off-grid areas.

Biomass

Collected firewood, cultivated energy crops and agricultural residues are energy resources that can be combusted or converted into solid, gas or liquid fuels through anaerobic heating or chemical processes.

Firewood is the preferred energy source for cooking, boiling water, and heating in the Lao PDR, often in open fires. A few industrial plants use woody waste to fire heaters and boilers or to produce charcoal.

Main constraints and challenges to financing BRE

The outlook for BRE in the Lao PDR is very promising and finance is available in the form of loans and micro-finance of appropriate magnitudes. However, some major barriers severely limit investment in BRE in the Lao PDR:

- **Low rate of return for investors compared to risk.** Marginal economic viability and high risk translates into high-interest, short-term loans. Most finance currently available to developers and individuals is not suitable to support BRE investments alone.
- **Insufficient government support to develop finance for BRE.** More government leadership and support in the form of incentives for BRE is needed in order to stimulate the market to favour capital investments for BRE technologies.
- **Inadequate regulatory framework and promotion of BRE.** Long-term planning documents such as NSEDP and NGPES must give more importance to BRE, to foster a more secure market for investors.



Recommendations to improve financing of BRE

- **Financial packages for investors** that take into account the unique opportunities and needs of BRE, and favour projects that support development objectives. Where risk is too high for private finance, public funds are needed to overcome investment barriers.
- **Public-private partnerships (PPP)** that enable market access for private actors, whilst achieving challenging development goals for the public entity. BRE are highly suitable for PPP, because the typically high initial capital investment followed by relatively low upkeep matches the preferred roles of public and private bodies: the former seek a fixed term involvement, whereas the latter are interested in a sustained service and source of revenue.
- **Financial products for individual households** including long-term soft loans with securities linked to moveable assets, and built in requirements for operation and maintenance by qualified technicians.

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Biofuels

Alternatives to gasoline and diesel, bioethanol and biodiesel can be made from sugar, starch or oil extracted from plants or animals. Crude vegetable oil may also be used in specially modified or low power diesel engines. Biodiesel can be produced on small or large scale, but bioethanol involves sophisticated equipment and is only viable on large scales.

Jatropha (oil crop), cassava (starch) and sugarcane (sugar) have received interest as possible biofuel feedstocks for the Lao PDR. Most investments to date have concerned contract farming feedstock for export. The potential for rural electrification and domestic diesel substitution is the subject of ongoing research.

Biogas

Anaerobic digesters generate a fuel gas from organic waste, whilst reducing the health and environmental hazards. Biogas is suitable for gas stoves, lamps, and certain combustion engines. A daily 20kg supply of manure can provide enough gas for one household. Biogas is an increasing resource for the Lao PDR, with rising numbers of livestock, and a few larger farms with more than 1000 animals.

In some provinces, subsidised domestic 4m³ and 10m³ biogas digesters have been implemented by the Biogas Pilot Program. There are a few running and planned industrial biogas plants, including one financed by a Clean Development Mechanism project.

Helvetas

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